

PATENT COOPERATION TREATY

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REC'D 08 MAR 2006

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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|---|---|---|
| Applicant's or agent's file reference TP103362/TPU | FOR FURTHER ACTION See Form PCT/IPEA/416 | |
| International application No. PCT/FI2004/050175 | International filing date (day/month/year) 24-11-2004 | Priority date (day/month/year) 27-11-2003 |
| International Patent Classification (IPC) or national classification and IPC See Supplemental Box | | |
| Applicant ASPOCOMP TECHNOLOGY OY et al | | |

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|---|---|---|---------------------|-------------------------------------|----------|---|--|-------------------------------------|----------------------------|---|---|--|-------------------------|--------------------------------------|--|---------------------------------------|---|
| <p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>8</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> | | | | | | | | | | | | | | | | | |
| <p>4. This report contains indications relating to the following items:</p> <table> <tr> <td><input checked="" type="checkbox"/> Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/> Box No. II</td> <td>Priority</td> </tr> <tr> <td><input checked="" type="checkbox"/> Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/> Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/> Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input checked="" type="checkbox"/> Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/> Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/> Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> | | <input checked="" type="checkbox"/> Box No. I | Basis of the report | <input type="checkbox"/> Box No. II | Priority | <input checked="" type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | <input type="checkbox"/> Box No. IV | Lack of unity of invention | <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | <input checked="" type="checkbox"/> Box No. VI | Certain documents cited | <input type="checkbox"/> Box No. VII | Certain defects in the international application | <input type="checkbox"/> Box No. VIII | Certain observations on the international application |
| <input checked="" type="checkbox"/> Box No. I | Basis of the report | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Box No. II | Priority | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Box No. IV | Lack of unity of invention | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Box No. VI | Certain documents cited | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Box No. VII | Certain defects in the international application | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Box No. VIII | Certain observations on the international application | | | | | | | | | | | | | | | | |

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| Date of submission of the demand 23-06-2005 | Date of completion of this report 23-02-2006 |
| Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88 | Authorized officer Bo Gustavsson / itw Telephone No. +46 8 782 25 00 |

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Cover sheet

INTERNATIONAL PATENT CLASSIFICATION (IPC):

G02B 6/43 (2006.01)

G02B 6/12 (2006.01)

H05K 3/46 (2006.01)

H05K 1/00 (2006.01)

H05K 1/02 (2006.01)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2004/050175

Box No. I Basis of the report

1. With regard to the language, this report is based on:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into _____,
which is the language of a translation furnished for the purposes of:
- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☒ the international application as originally filed/furnished
- ☐ the description:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ the drawings:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos. 2, 15

because:

☐ the said international application, or the said claims Nos. _____
relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 2, 15
are so unclear that no meaningful opinion could be formed (*specify*):

According to the invention as claimed in claims 2 and 15, the optical channel is made from a material which "...may be brought into an aggregation state which (is able to) guide optical signals...". Such statements are not consistent with the demands of Article 6 PCT. This part of claims 2 and 15 has therefore been neglected in the examination process.

☐ the claims, or said claims Nos. _____ are so inadequately supported
by the description that no meaningful opinion could be formed (*specify*):

☐ no international search report has been established for said claims Nos. _____

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13ter.1(a) or (b) and 13ter.2.

☐ a meaningful opinion could not be formed without the tables related to the sequence listings; the applicant did not, within the prescribed time limit, furnish such tables in electronic form complying with the technical requirements provided for in Annex C-bis of the Administrative Instructions, and such tables were not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in electronic form only, do not comply with the technical requirements provided for in the Annex C-bis of the Administrative Instructions.

☐ See Supplemental Box for further details.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2004/050175

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|--------|------------------------------|-----|
| Novelty (N) | Claims | <u>9, 11, 12, 19-23</u> | YES |
| | Claims | <u>1, 3-8, 10, 13-18</u> | NO |
| Inventive step (IS) | Claims | <u>9, 11, 12, 20</u> | YES |
| | Claims | <u>1-8, 10, 13-19, 21-23</u> | NO |
| Industrial applicability (IA) | Claims | <u>1-23</u> | YES |
| | Claims | | NO |

2. Citations and explanations (Rule 70.7)

The invention relates to a wiring board having integrated therein one or more optical waveguides. The board comprises at least one substrate made of plastic, in which the optical waveguide is formed by moulding or hotpressing. The invention also relates to a method of making the wiring board.

Documents cited in the International Search Report:

D1: Electronics Letters, Vol. 32, No. 25, 1996, p. 2329-2330
 D2: US 6 539 157 B2
 D3: First Int. IEEE Conf. on Polymers and Adhesives in Microelectronics and Photonics, Proceedings, 21-24 Oct. 2001, p. 337-343
 D4: US 2003 128 907 A1
 D5: EP 1387193 A1
 D6: US 5446814 A1

Optical backplanes and/or electro-optical wiring boards according to claim 1 are known from documents D1-D3. According to the documents the wiring boards comprise a substrate made from a plastic material such as e.g. polycarbonate, PMMA, polyimide or epoxy resin. An optical waveguide channel is formed in the substrate by moulding or (hot) embossing. The channel formed in the substrate is then filled with a material having desired optical characteristics. Thus, the invention defined in claim 1 is not new and consequently lacks novelty and inventive step.

Due to the lack of clarity in claim 2 (see Box III), the only special technical feature specifying the claimed invention is that the thermal expansion coefficient of the optical waveguide material substantially equals that of the substrate material.

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: BOX V

The problem to be solved by the invention is to avoid internal stress from being induced between the substrate and the waveguide.

However, from D4 a method of manufacturing an opto-electric wiring board is known wherein this problem is observed. According to the document the substrate is made from thermoplastic material such as polycarbonate and the waveguide material is selected from materials having an identical thermal expansion coefficient as the substrate material.

It is considered to be a well-known problem for the person skilled in the art that stress may be induced when using different materials in an integrated structure. It is therefore also considered to be an obvious step for the skilled person to select materials that will not introduce such internal stress in the structure.

Having knowledge of any of the documents D1-D3 and document D4, a person skilled in the art would therefore not hesitate to use the teachings therein to arrive at a wiring board according to the invention as claimed in claim 2. The invention therefore lacks inventive step.

Furthermore, the invention referred to in claims 3-5, relating to the substrate material and the manner in which the optical channel is formed, is considered to lack novelty in view of what is known from the cited documents D1-D3. Also, the invention referred to in claims 6-8 and 10, relating to the light beam direction changing means is considered to lack novelty in view of what is known from D1.

According to at least D2-D4 the optical waveguide comprises a core and a cladding layer made from selected plastic materials.

The invention as claimed in claim 13 therefore lacks novelty.

As shown above, a method of manufacturing a wiring board according to the invention as claimed in claim 14 is known from any of D1-D3.

The claimed invention therefore lacks novelty.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of BOX V

Due to the lack of clarity in claim 15 (see Box III), the invention as claimed therein comprises no special technical features in addition to those of claim 14.
The invention as claimed in claim 15 therefore lacks novelty.

Furthermore, the invention referred to in claims 16-18, relating to the substrate material and the manner in which the optical channel is formed, is considered to lack novelty in view of what is known from the cited documents D1-D3.

The claimed invention according to claims 19-23 differs from the cited documents in that the manufacturing process is a continuous process.

In D3 a process for manufacturing a electro-optic wiring board is described. Although not explicitly described as a continuous process (see chapter 3.1), a person skilled in the art would have no difficulties in elaborating the shown process to a continuous one.

The invention as claimed in at least claims 19 and 21-23 is therefore considered to lack inventive step.

Documents D5 and D6 have not been used in the examination process.

Document D5, which is published after the filing date of the present application but having a priority date prior to the priority date of the application, describes an optical waveguide apparatus comprising a hybrid opto-electronic circuit board. Light is propagated in the hybrid circuit board from a light source to a light receiver and reflected e.g. by a grating towards the receiver.

D6 describes a prior-art moulded reflective optical waveguide module.

The invention as claimed in claims 9, 11, 12 and 20 differs from the cited prior-art by defining a preferred form of the optical channel and directing elements and by specifying the continuous manufacturing process. None of the cited documents show or suggest optical channels, elements or processes according to the invention.

The invention as claimed in claims 9, 11, 12 and 20 therefore has novelty and show inventive step.

The invention is also considered to have industrial applicability.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2004/050175

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

| Application No. Patent No. | Publication date (day/month/year) | Filing date (day/month/year) | Priority date (valid claim) (day/month/year) |
|-------------------------------|--------------------------------------|---------------------------------|---|
| EP 1387193 A1 | 04.02.2004 | 28.07.2003 | 29.07.2002 |

2. Non-written disclosures (Rule 70.9)

| Kind of non-written disclosure | Date of non-written disclosure (day/month/year) | Date of written disclosure referring to non-written disclosure (day/month/year) |
|--------------------------------|--|---|
| | | |